



BRITISH HONDURAS

ANNUAL REPORT

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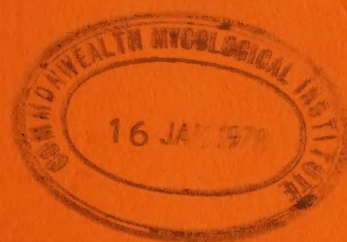
of the

DEPARTMENT OF AGRICULTURE

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FOR THE YEAR

1971



ERRATA for 1971 ANNUAL REPORT of the DEPARTMENT OF AGRICULTURE

- p2. para 2 line 3 "--the increased production nec--"
 para 4 line 5 "\$1.00 to \$1.25 per contract box (90 lbs. net)"
- p3. para 1 line 3 "--The Citrus Research Unit --"
- p5. para 4 line 1 "Tropical Storm 'Laura'"
- p6. para 6 line 6 "--farmers in the Macaw"
- p7. para 1 line 8 " resources
 para 2 line 2 after "country" insert "having already attained self-sufficiency in beef. Beef Production."
 para 3 line 6 "weak bargaining position."
 para 5 line 5 "--(re-) source endowments--"
- p8. para 4 line 1 "--attained self-sufficiency in--"
 para 4 line 2 delete "s" from "dozens"
 para 5 line 2 delete "s" from "districts"
 para 6 line 4 "There is considerable"
- p10. para 1 line 5 "--through specialisation."
- p.11. para 1 line 4 "-- were Bluebelle and--"
 para 6 line 4 "was disc - ploughed--"
 para 7 line 2 "-- a post-emergent herbicide --"
 para 9 line 1 "--of the five corn varieties"
- p12. para 4 line 3 "Gesaprim"
- p13. para 2 line 7 end of line delete "we"
 para 2 line 9 "--insect damage and"
 para 3 line 1 "--resistance to drought, Sorghum--"
- p14. para 1 line 7 "to control Diabrotica sp."
 para 3 line 3 insert comma, to read "the tallest, in short,"
 para 3 line 5 "--and it appears that"
 para 4 heading "Soybean (Glycine Max)"
 para 6 line 3 "the plants were stunted in growth."
 para 6 line 5 "flowering and Curtain approximately 80%"
- page numbering p 15 between p14 and p16 (not p14).
- p15 para 3 line 2 "--it is not possible to draw--"
 para 2 and para variety "yellow Granex"
- p16 para 1 line 5 "(Lon-)chea Chabybea Larvae"
 table Nutrient per acre
 5th line "N-43 P - 69"
- p17. table line 5 variety "Flagall"
- p19. table 2 Treatment - line 4 "Terracur P."
- p21. para 2 line 2 after "covered" insert "with heavy cloth, measuring 2ft x 2ft x 3ft arranged in three rows in"
- p22 Table Treatment line 1 "1% Lindane"
- p24. Table footnote line 3 "in each sample determined."
- p29. para 1 line 2 after "drawn" insert "for the corn variety"

ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE

FOR THE YEAR 1971

PART 1: GENERAL REVIEW OF AGRICULTURE

A. WEATHER CONDITIONS:

Weather conditions were generally suitable for agriculture, the major exception being during the month of November when tropical storm 'Laura' caused severe flooding of rivers in the Belize, Cayo, and Stann Creek Districts. Crop and livestock losses were estimated at \$0.3 million, and the transportation system in the above-mentioned districts was disrupted for several days following the storm.

The rainfall pattern during the year was somewhat irregular. The long dry season lasted from January to June. The main rainy season started during the first week of June, but was disrupted by a fortnight of relatively dry weather from mid-June until early July. Heavy rains fell throughout July, the latter half of August, September, and October. The customary short dry season occurred during the first half of August. Rainfall during November was above normal; this can be ascribed to tropical storm 'Laura' which was an unexpected feature at this time of the year. During the month of December, rainfall was above normal in the Northern half of the country, but was below normal in the South. The lowest total rainfall recorded was 41.26 at Cadena Creek in the Cayo District, while the highest was 166.57 inches at the Toledo Agricultural station. The country-wide average of total recorded rainfall was 71.48 inches. Details of rainfall distribution for individual stations are contained in Appendix 1 of this report.

During the dry season, day temperatures prevailing over inland areas were generally high, but temperatures dropped considerably at night. Over coastal areas, the heat and high humidity were tempered by cool breezes blowing in from the Caribbean Sea. At the Belize International Airport, day temperature ranged from a low of 54° F to a high of 94° F. The average Monthly Maximum and average Monthly Minimum temperatures recorded at the various meteorological stations are contained in Appendix 11.

The average relative humidity prevailing during the year under review was 83%. The monthly average of relative humidity recorded at the different stations can be obtained from Appendix 111 of this report.

B. EXPORT CROPS:

Sugarcane:

Harvesting of sugarcane for the 1970/71 crop got off to an early start as grinding operations commenced at both the Tower Hill and Libertad sugar factories on the 30th November, 1970. The heavy rains which fell during December, 1970 hampered cane harvesting in the Orange Walk district, and the factory at Tower Hill was forced to close down for two weeks during this period. A further week of good cane harvesting weather was lost during January when the Cane Farmers' Association ceased delivering cane to the factories following a labour dispute in the industry.

There was a considerable increase in the number of cane fires occurring during the month of March. Efforts were made by the Department of Agriculture to discourage such fires through spot announcements over Radio Belize. Grinding operations ceased at the Tower Hill factory on May 22nd and at the Libertad factory on July 4th.

Although the crop was not quite as large as the 1969/70 crop, mainly due to froghopper damage the previous year, the total production of sugar amounted to 64,851 long tons - the second largest realized in the history of the industry. This production represents a surplus of 4,851 long tons over the initial production target of 60,000 long tons. In addition, 22,960 long tons of molasses were produced. The following figures indicate the distribution of sugar cane production between the company and the cane farmers, and the distribution of sugar production between the two factories.

1970/71 CROP DATA

	<u>Tower Hill Factory</u>	<u>Libertad Factor</u>	<u>TOTALS</u>
1. Cane Deliveries (long tons)			
Cane Farmers..	118,285	246,266	364,551
Company	184,663	83,415	268,078
TOTAL	302,948	329,681	632,629
2. Sugar Produc tion(long ton)	28,928	35,923	64,851
3. Molasses Produc tion (long Tons)	10,698	12,262	22,960
4. Tons Cane/ Ton Sugar Ratio			
Farmers Cane	9.92	9.08	-
Company Cane	10.86	9.47	-
Weighted Average	10.49	9.18	-

Towards the end of the crop it was announced that the country's basic U.S. quota was being increased to around 33,250 long tons, it is anticipated that the increased production necessary to meet the additional allocation will result in increased foreign exchange earnings of approximately four million dollars.

Citrus:

The 1970/71 citrus crop lasted from September, 1970 to July, 1971, and was the largest in the history of the industry. A record total of 1,300,513 contract boxes of fruit were delivered to the two processing factories. This total was comprised of 924,662 boxes of Oranges and 375,851 boxes of grapefruit.

The citrus processors bought grapefruit from producers at an advance price of \$1.25 per contract box (80 lbs. net), while the Citrus Growers' Association paid an advance price of \$2.00 per contract box (90 lbs. net). Oranges fetched advance prices ranging from \$1.00 to \$1.25 per contract box (90 lbs. net). A cess of 6 cents was deducted from the price of each contract box of fruit delivered for processing, this cess being used to finance operations of the Citrus Growers' Association as well as providing that Association's contribution to the Citrus Research Scheme.

Citrus acreages increased slightly over the previous crop year. The area under oranges increased by 100 acres to 6,730 acres, while that under grapefruit increased by 30 acres to 2,471 acres. The total area under citrus was therefore 9,201 acres.

The incidence of premature fruit drop on orange trees and the Mexican fruit fly on grapefruit continued to be of concern to producers. The Citrus Research Unit has, however, evolved promising control measures in both cases. Aerial spraying to control the Mexican fruit fly was practised by twelve growers. Tropical Storm 'Laura' caused substantial damages to groves and resulted in an estimated loss of 60,000 boxes of oranges.

The following figures indicate the distribution of processing between the British Honduras Fruit Company and the Citrus Company of British Honduras:

DISTRIBUTION OF PROCESSING, 1970/71

	<u>B.H. Fruit Co.</u>	<u>C.C.B.H.</u>	<u>TOTALS</u>
ORANGES (boxes of 90 lbs, net each)	327,997	596,665	924,662
GRAPEFRUIT (boxes of 80lbs, net each)	90,105	285,746	375,851
TOTAL CITRUS (contract boxes)	418,102	882,411	1,300,513

Exports of citrus products during the crop year were as follows:

EXPORTS OF CITRUS PRODUCTS, 1970/71 CROP

(a) B.H. FRUIT CO. LTD.

4,836	American Gallons	58° Brix Frozen Grapefruit Concentrate.
23,088	"	60° Brix preserved Orange "
202,124	"	65° " Frozen Orange "

(b) Citrus Company of B.H. Ltd.

<u>Product</u>	<u>Quantity (net lbs.)</u>
Grapefruit Sections	6,678,205
Grapefruit Juice (Single strength)	1,624,782
Grapefruit Concentrate (4/1)	260,023
Essential Grapefruit Oil 8	1,456
Orange Juice (Single strength)	7,599,571
Orange Concentrate (60° Brix)	972,965
Orange Concentrate (65° Brix)	1,470,220.
Cold Pressed Orange Oil	82,512
Essential Orange Oil	41,472

Cucumbers:-

Two commercial firms, Belize Offshore Growers Ltd. and Savannah Products Ltd. continued to produce cucumbers for export to the United States winter market. The total area cultivated to cucumbers during the 1970/71 crop season was 885 acres. More than 11 million lbs. of cucumbers were exported from this crop.

Papaya:-

The processing plants located in the Orange Walk District purchased fresh fruit from outgrowers. During 1971, a total of 2,892,346 lbs of fresh papaya were processed into a diced, dehydrated product for export mainly to Canada and the United States. Exports amounted to 232,985 lbs. during 1971..

Bananas:-

The Banana industry, which was/relatively important export industry in the mid-1960's, has declined considerably and, in fact, no exports have been recorded since 1969. The main causes of this decline were breakdown in transportation and marketing arrangements, and the infection of banana plantations by 'Sigatoka' disease (Mycosphaerella musicola).

The commercial area under bananas during 1971 was estimated at 1,500 acres occurring mostly in the Stann Creek district, which has been the traditional banana-growing area. Efforts are currently being made to rehabilitate the industry, provided suitable marketing arrangements can be concluded, it is envisaged that the acreage of bananas will expand to around 4,000 acres by 1975.

Cocoa:-

Central Investments Ltd. and Roaring River Estate continue to be the only producers of cocoa in the country. During 1971, no new plantings were undertaken. Maintenance of some fields was carried out, while both maintenance and rehabilitation work was done on others. No exports were made during the year under review.

C. FOOD CROPS.

Rice:-

An estimated 6,883 acres of rice were planted and harvested during 1971 yielding around 11,400,000 lbs. of paddy rice. In addition, Big Falls Ranch Ltd. planted 3,072 acres of mechanized rice during November - December, 1971 for harvesting March - May, 1972. The distribution of the total acreage according to districts and according to whether mechanized or not can be seen from the table below:-

<u>DISTRICT</u>	<u>ACREAGE PLANTED</u>	<u>ACREAGE MECHANIZED</u>
Orange Walk	431	-
Cayo	531	190
Belize	1,237	485
Stann Creek	84	-
Toledo	4,600	690
TOTALS	<u>6,883</u>	<u>1,365</u>

The acreage under mechanized rice increased considerably during 1971, particularly in the Toledo district where several small farmers took advantage of the Department's machinery services together with credit from the Agricultural Credits Fund. Several Rice cooperatives have been organised in this district, largely owing to the demonstrative effects of the rice pilot schemes being run by the Department.

A large part of the total production continues however, to be in the hands of shifting cultivators who use traditional production techniques and, consequently, obtain lower yields.

Marketing Board purchases of paddy during 1971 were as follows :-

<u>DISTRICT</u>	<u>PADDY PURCHASES (lbs)</u>
Orange Walk	62,900
Belize	1,52,000
Cayo	31,920
Stann Creek	23,000
Toledo	4,360,050
TOTAL	4,629,870

Corn:-

It was estimated that 25,321 acres of corn were planted during 1971 from which approximately 35,000,000 lbs of dried grain were harvested. The distribution of the total area planted according to districts is shown below:-

<u>DISTRICT</u>	<u>ACREAGE PLANTED</u>	<u>ACREAGE MECHANIZED</u>
Corozal	1,278	135
Orange Walk	13,530	7,153
Belize	1,244	170
Cayo	5,330	2,911
Stann Creek	593	26
Toledo	3,346	NIL
TOTALS	25,321	10,395

The Mennonites in the Orange Walk and Cayo districts continue to play a dominant role in corn production, accounting for over 90% of the acreage mechanized. Two farmers' cooperatives in the Corozal district cultivated a total of 125 acres of corn mechanically, and it is anticipated that this healthy trend towards mechanization will continue.

The crop suffered as a result of tropical Storm 'Laura' which occurred during November. It is estimated that a loss of some 1.2 million lbs of grain suffered mainly along the Belize River.

Red Kidney Beans:-

The 1970/71 Red Kidney beans crop was affected by unfavourable weather conditions. Some 5,225 acres were planted and an estimated 2 million lbs. of dry beans harvested. Yields were in the region of 400 lbs/acre which is only one-half the average yield realized during normal seasons. During the year, R.K. beans were marketed at between \$17 and \$24 B.H. per 100 lbs. The Marketing Board purchased 128,233 lbs. at a guaranteed price of \$18 per 100 lbs.

Planting for the 1971/72 crop commenced in October but was interrupted in November by tropical Storm 'Laura'. By the end of the planting season, 5,046 acres had been planted for harvesting during February to March, 1972. Low yields are expected from this crop due to the very unfavourable weather conditions attendant upon the above-mentioned storm. The distribution of acreages by district for the 1971/72 crop is shown on the following page:-

<u>DISTRICT</u>	<u>ACREAGE PLANTED</u>	<u>ACREAGE MECHANIZED</u>
Corozal	62	53
Orange Walk	2,494	2,428
Belize	1	NIL
Cayo	2,329	2,308
Stann Creek	10	NIL
Toledo	150	NIL
TOTALS	<u>5,046</u>	<u>4,789</u>

The crop is grown mainly by the Mennonites who cultivate it with corn in a rotation. This accounts for the large proportion of the total acreage that is mechanized.

Other Pulses:-

368 acres were planted to Black Beans and 77 acres to Pinto beans in the Corozal and Orange Walk districts. Unusually heavy rains caused waterlogging of fields with the result that crops rotted and some 48 acres of Black beans were completely lost.

A total of 335 acres of peanuts was planted mainly by the Mennonites in the Orange Walk District. Yields averaged 1,000 lbs. per acre, and the entire crop was consumed locally.

Root Crops:-

Root crops such as yams, coco yams, sweet potatoes, and cassava were grown for local consumption mainly on small plots of an acre or less in size. A total of 591 acres was cultivated to root crops, of which the Stann Creek and Toledo districts accounted for more than 50 per cent. All cultivations were done by traditional methods.

Plantains:-

545 acres were planted to this crop during 1971, but the crop suffered considerable damage as a result of tropical storm 'Laura'. A shortage of plantains was experienced towards the end of the year.

Vegetables:-

The supply of vegetables continued to be inadequate during 1971, and local production had to be supplemented by importations from Mexico and Guatemala. An estimated total of 110 acres was planted to cabbages, tomatoes, and peppers during 1971. The main producers for the local market are the Mennonites in the Orange Walk and Cayo Districts, and subsistence farmers in the Ma. Caw Bank area of the Cayo District. Approximately 36 acres of vegetable crops were lost in November.

Other Crops:-

Considerable amounts of mangoes, watermelons, avocados, cashew, and a variety of other fruits are grown for the local market on noncommercial small holdings. The lack of organised production and marketing, however, makes it extremely difficult to get reliable estimates of total production of such crops.

D. LIVESTOCK INDUSTRY

Cattle:-

A cattle census carried out in December, 1970 indicated that the national herd was comprised of 38,399 head. By the end of 1971, this number had increased to approximately 40,000 head - or an annual increase of 6.5 per cent. This increase occurred at a lower rate than during the preceding year but, together with some holding back of slaughter cattle in anticipation of an export market, was partly responsible for the growing pressure on pasture resources.

The emphasis continued to be mainly on beef production, the country is increasing as a corollary of the growth in cattle population. It is gratifying to note, however, that this build-up in the national herd, and during the year under review of an exportable surplus, has not been at the expense of domestic consumption. In fact, consumption is increasing as can be seen from the figures below:-

CONSUMPTION OF BEEF, 1969-1971

<u>Year</u>	<u>No. of Animals Slaughtered</u>	<u>Total Dressed Wt (lbs.)</u>
1969	3,081	960,650
1970	3,310	1,045,517
1971	4,390	1,500,304

A detailed breakdown of slaughterings can be obtained from Appendix III of this report.

The auction markets, which played a significant role in the revival of the beef cattle industry in 1969, were moribund throughout 1971. With the gradual development of a buyers' market and the collapse of organised marketing, prices to the smaller producers fell significantly during the year, no doubt due to their weak bargaining position. The Belize Meat Packers' abattoir began operating in January, but required numerous alterations to bring the plant up to standard and much staff training to acquire the necessary expertise by the end of the year the plant had yet to receive U. S. D. A. certification. The development of an export market for beef is essential for the continued development of the beef cattle industry.

The dairy industry is still in its infancy, most of the fresh milk being produced by the Mennonite community at Spanish Lookout in the Cayo District. Western Dairies Ltd. of Spanish Lookout continued to supply pasteurized milk to consumers in Belize City and Belmopan during the year under review.

Meanwhile, the value of dairy imports during 1971 was \$4,571,634. A breakdown of these imports is contained in Appendix IV of this report. There is, therefore, tremendous scope for expansion of the dairy industry. Given the country's natural resource endowments, there is no reason why an appreciable proportion of the total national requirement for dairy products should not eventually be met from local production.

Pigs:-

Although we do not have accurate knowledge of the pig population, it can be said that numbers increased substantially during 1971. This was reflected in increased slaughtering, and facilitated by restrictions on the importation of pork and pork products under the Supplies Control Ordinance. Comparative data on the slaughter of pigs during the triennium 1969 - 1971 is contained in the table below:-

SLAUGHTER OF PIGS

<u>Year</u>	<u>No. of Pigs Slaughtered</u>	<u>Dressed Wt.(Lbs.)</u>
1969	5,602	418,960
1970	6,542	448,413
1971	8,526	729,125

There was also a significant increase in the average dressed weight at slaughter (85.5 lbs. as compared to 69.0 lbs. for 1970). The future expansion of the pig industry will depend very largely on the availability of adequate supplies of corn at economic prices. See also Appendix III for distribution of slaughtering among districts.

Poultry:-

A very substantial increase occurred in the production of poultry meat during 1971. The Mennonite communities were once the main commercial producers, but with the establishment of poultry co-operatives throughout the country and a few large-scale firms, the pattern of production is rapidly changing. If the present rate of expansion is sustained, it is possible that the country will be self-sufficient in poultry meat by the end of 1972. Imports of poultry meat during 1971 were of the order of 1.5 million lbs. On the other hand, 46,604 live birds were exported to Mexico during the year.

The country has already attained self-sufficiency in table eggs, and, in fact, 31,495 dozens were exported to Mexico during 1971. The only eggs imported are for hatching.

Small flocks of turkeys were reared in several villages, particularly those of the Belize districts. As is customary, these were marketed around Christmas for the traditional Christmas dinner.

Sheep and Goats:-

Sheep and goats continued to play a minor role in the live-stock industry. A strong demand exists both locally and in Mexico for live sheep to be 'barbecued', and the local demand for mutton is far from being satisfied. There is considerable interest in sheep and goats, but the population base is so small that numbers can only increase slowly unless a vigorous importation policy is pursued.

Apiculture:-

Honey production continues to be concentrated in the Northern districts of Corozal and Orange Walk as is indicated in the table below, which gives the distribution of apiaries, hives and beekeepers as at 31st December, 1971:.

<u>District</u>	<u>No. of Apiaries</u>	<u>No. of Hives</u>	<u>No. of Beekeepers</u>
Corozal	42	1,058	22
Orange Walk	69	1,500	51
Belize	12	145	4
Cayo	5	104	4
Stann Creek	6	127	2
Toledo	<u>2</u>	<u>64</u>	<u>2</u>
TOTALS	<u>136</u>	<u>2,998</u>	<u>85</u>

It may be recalled that in 1969 the beekeeping industry suffered as a result of the aerial application of insecticides to cane fields. Several apiaries were completely wiped out, the interest of beekeepers in the area waned, and honey production declined to less than a quarter of its former level. Satisfactory spraying arrangements have since been evolved, and it is gratifying to note that production is on the increase once more as is reflected in the figures below:-

HONEY PRODUCTION, 1967-1971

<u>Year</u>	<u>Honey Production (lbs.)</u>
1967	425,078
1968	468,158
1969	112,964
1970	107,447
1971	229,672

As far as honey production is concerned, we have a largely untapped potential. It is hoped that more and more producers will take advantage of the remunerative prices being offered for honey on the export market. During the year, 206,573 lbs. of honey were exported to the United Kingdom at prices ranging from £114 to £135 per long ton F.O.B.

PART 11.

WORK OF THE DEPARTMENT OF AGRICULTURE

A. RE-ORGANIZATION:

In March, 1971 the Department of Agriculture was re-organized into five divisions, namely: the Crops Research, Crops Extension, Livestock, Mechanical, and Administrative divisions. This move was made in an effort to increase the efficiency of the Department's personnel through specialisation. Each division has its own team of specialists and supporting staff, and is charged with carrying out a specific segment of the Department's programme of work. The distribution of senior staff among the various divisions as at 31st December, 1971 can be obtained from Appendix V of this report.

B. POLICIES:

During the year under review, the basic policies of the Department remained unchanged, and consisted mainly of:

(1) conducting research on crops and livestock which are of economic importance to the country.

(2) disseminating the results of experimental research to farmers through the extension services;

(3) encouraging farmers to adopt modern production techniques as to improve their productivities;

(4) promoting mechanized farming by providing mechanical services to farmers at subsidised rates; and

(5) Exhorting farmers to increase their production of crops and livestock products so as to enable the country to attain self-sufficiency in food, and to develop export surpluses of those products in which we possess comparative advantage.

C - AGRICULTURAL RESEARCH

(1) CROPS RESEARCH:

Corn:

60 acres of corn were planted at Central Farm in January. The crop progressed satisfactorily until cattle entered the field and trampled 30 to 40% of the plants. Otherwise, the crop was relatively free of pests, matured in April, and was harvested in June. Yields compared favourably with that of the main season crop.

110 acres were planted to this crop at Central Farm in July. The two varieties used were Poey T-66 and Pioneer X306. Two weeks after emergence of the crop, Atrazine (Gesaprin 80) was applied at the rate of 2.75 lbs. in 20 gallons of water per acre. This treatment gave satisfactory control of annual broadleaf and grass weeds, but perennial broadleaf and grassy weeds and onion-grass (*Cyperus* sp.) were not controlled. Towards the end of the month, army worm attacked in moderate numbers. Sevin at 2 lbs. per acre was applied, but rainy weather rendered this treatment inadequate. Because of uneven spacing it was necessary to hand plant some sparsely populated areas, while in other areas it was necessary to weed out some plants. The field was fertilized on 20th July with urea at the rate of 75 lbs/acre. Application of Atrazine at the rate of 2.5 lbs/acre was carried out on the same date, and this effectively controlled all weeds except Nutgrass (*Cyperus* sp.).

Yields were of the order of 5,000 lbs/ acre.

Rice:

The Department continued to operate pilot schemes at Mafredi and San Pedro Columbia in the Toledo district. Two hundred acres were mechanically cultivated at Mafredi, and one hundred acres at San Pedro Columbia. Varieties utilized were bluebelle and Star-bonnet.

Heavy rains which fell during the month of June resulted in widespread flooding. Fields were too waterlogged to allow the entry of wheeled machinery, and there were consequent delays in the application of fertilizers, weedicides, and insecticides.

The fields became heavily infested with broadleaf weeds, and there was a severe armyworm attack. Spraying was carried out with the use of knapsack sprayers. 2, 4-D was used to control weeds, while Dipterex at 1 lb active ingredient per acre was used to combat armyworm. Another armyworm attack occurred in July.

Rat population in rice fields increased significantly, and these rodents may well prove to be important insofar as the reduction of yields is concerned.

b. Experimental Trials:-

1. Hybrid Corn Observation Trial.

Introductory:- Hybrid corn has recently been introduced into the country, and the most promising variety so far is the Pioneer X 306 hybrid obtained from the Pioneer seed company in Jamaica. Four hybrid varieties were obtained from the U. S. A., and an observation trial was laid down in order that the growth habits and yields of these varieties could be compared with those of the Pioneer X 306 hybrid.

Material and Methods:-

The varieties of corn used in the trial were: Pioneer X 306, 100, 4, 5-55 and M - 77. They were planted on 20th July, 1971 on cuxu brown clay loam at Central Farm. Prior to planting, the area was disx-ploughed and harrowed twice. Immediately after planting, the area was fertilized with 10:30:10 fertilizer at the rate of 200 lbs./acre.

Seeds were planted in rows 36 inches apart and spaced ten inches in rows. A pre-emergent herbicide Gesaprim (Atrazine) was applied at the rate of 2.5 lbs per acre after the corn plants emerged.

The plots were sprayed alternately with Sevin and Dipterex at the rate of 2 lbs /acre and 1 lb./acre respectively in 21 gallons of water to control armyworm (Spodoptera frugiperda) and Diabrotica sp. diaboltata, two major pests of corn in the country.

Results and Discussions:-

The Physical characteristics of the fine corn varieties which were observed are tabulated on the following page.

PHYSICAL CHARACTERISTICS OF CORN VARIETIES.

Variety	Average height of Plants	Average Ear Height	Average Length of Ear	Average Weight of Ear	% Polli-nation	Yield in Grammes.
X-306	88 ins.	55 ins.	29.3 cm	372 gms	100.0	1,146
no100	74 "	24 "	24.5 "	194 "	89.2	546
No. 14	77 "	24 "	26.5 "	182 "	89.2	462
5-55	74 "	19 "	35.3 "	203 "	30.0	216
M - 77	47 "	18 "	-	-	-	-

Yield = weight of 5 ears of corn shelled.

From the above table, it can be seen that Pioneer X 306 also is the tallest, whereas M - 77 is the shortest, variety. Pioneer X 306 also produces ears highest above the ground, a characteristic which facilitates mechanical harvesting as ears will be produced above weed growth. The variety M - 77 is not adapted to the climate of the country as it produced no grains and only very small ears. This trial confirmed that Pioneer X 306 is the best suited variety for our environment.

2. Sweet Corn Variety Observation Trial

Introductory:-

Sweet corn has never been grown successfully in Belize. Six varieties of sweet corn were obtained from the U. S. A., and it was decided to conduct a trial in order to observe the performances of these varieties under local conditions. Particular attention was paid to the quality of cobs produced and resistance to pests and diseases.

Materials and Methods:-

The six varieties used in the trial were:- Golden grain # 2, Deep Gold F 32, Early 10, Iogreen 91, No 68 and Tate # 20. Planting was carried out on the 20th July, 1971, but due to shortage of seeds it was not possible to replicate the trial. The trial was laid down on the Cuxu brown clay loam at Central Farm, and consisted of four rows each of the varieties Golden Grain # 2, Deep Gold F 32, Early 10, and Iogreen 91 and two rows each of the remaining varieties.

The seeds were sown in rows 36 inches apart and spaced 10 inches apart within rows. 10:40:10 fertilizer was applied to the plots at a rate equivalent to 100 lbs per acre. Gesaprin (Atrazine), a pre-emergent herbicide, was applied at the rate of 2.5 lbs/acre in 21 gallons of water immediately after planting. The plots were sprayed alternately with Sevin and Dipterex at 2 lbs/acre and 1 lb/acre respectively to control armyworm (Spodoptera frugiperda) and Diabrotica sp.).

Results and Discussions:-

The table below gives the physical characteristics of the different varieties:-

PHYSICAL CHARACTERISTICS OF SWEET CORN VARIETIES.

Variety	Average Weight of Ears (oz.)	Average Weight of Cobs (oz.)	Percentage Cobs/ Ears %	Average Length of Cobs (inches)	Average Height of Cobs above ground (ins)	Average Height of Plants (inches)
Golden Grain 2	6.5	3.4	52.3	8.2	11.5	53.3
Iogreen 91	5.9	2.7	45.7	6.2	13.0	44.3
Deep Gold F 32	5.2	2.1	40.4	6.8	12.0	48.1
Early 10	4.4	2.1	47.8	5.7	10.3	57.6
Tate 20	--	--	--	--	12.0	61.0
No. 68	--	--	--	--	37.2	68.2

As can be seen from the above table, the varieties Tate 20 and # 68 produced no cobs - the ears were quite small and undeveloped. Those varieties which did produce cobs were approximately 85% unpollinated and grains were sparse on the cobs. It concluded from this experiment that during the period of the experiment conditions were not conducive to the production of grain from the six varieties of sweet corn tested. More trials will be needed to determine the exact cause of this poor performance. All varieties suffered tremendously from insect damage and Helminthosporium blight. The stalks and leaf blades of all varieties were poorly developed.

3. Grain Sorghum Variety Observation Trial.

Introductory:-

Because of its resistance to draught, Sorghum is considered as a suitable crop to be grown during the dry periods following the main corn crop. Four hybrid varieties were obtained from the Agribusiness Management Company of Maryland, U. S. A. and an observation trial was established in order to determine their performance under local conditions.

Materials and Methods

The varieties used in the trial were C-66 CHHD-1 and C-555. The trial was laid down on Cuxu brown clay loam at Central Farm on 22nd July, 1971. The seeds were sown in rows 30 inches apart and sprung between plants within rows was 4 inches. 10:40:10 fertilizer was applied at a rate equivalent to 100 lbs / acre. The plots were sprayed alternately with Sevin and Dipterex at 2 lb/acre and 1 lb/acre respectively to control Diabrotica sp. and Spodoptera Frugiperda.

Results and Discussions:

The table below shows the characteristics and performance of the four varieties tested.

Physical Characteristics of Grain Sorghum Varieties

Variety	Pollination	Head Size (cm)	Weight of Heads(gm)	Height of Plants(cm)	Weight of grains(gm)
C-666	16	11.2	349.1	48.2	58.0
CHHD-1	18	8.7	240.0	41.3	70.0
CR - 1	0	11.0	181.5	87.8	-
C -555	29	10.9	303.9	47.5	113.9

Five heads were randomly selected and weighed.

The variety C-555 had the highest % pollination and, consequently, the highest yield. The variety CR-1 produced no grains and was the tallest in short, this variety exhibited no hybrid characteristics. All the varieties which produced grain were infected with smut, and it appears that none of these hybrid varieties is adapted to our conditions.

4. Soybean (Glycerine Max) Variety Trial.

Introductory:-

A soybean variety trial was established at Central Farm in December, 1970. The purpose of the trial was to observe the growth habits and to assess the yield potential of the different varieties.

Materials and Methods:-

The five varieties tested were Pelican, Dan, Curtain, Acadian, and 62/3977. Observations were taken of the heights of plants after one month's growth. The plots were sprayed with Zineb and Dipterex to control rust and Spodoptera sp. respectively.

Results and Discussions:-

Observations taken on 1st February, 1971 showed that the variety Curtain was the most uniform in growth. Acadian produced the poorest stand, and the plants were started in growth. On 3rd February it was observed that Dan exhibited approximately 65% flowering and approximately 80%. The trial was harvested in May. The table below gives the average heights of the various cultivars after one month's growth:-

Average Heights of Soybean Varieties
(cm)

Variety	BLOCK 1	BLOCK 11	BLOCK 111	BLOCK IV	AVERAGE
Pelican	22.50	21.00	19.75	19.75	20.75
Dan	18.75	18.75	20.00	19.50	19.25
Curtain	23.75	21.75	22.50	23.75	22.94
Acadian	16.75	18.00	15.25	16.50	16.60
62/3977	21.50	21.00	20.75	21.00	21.04
Total	103.25	100.50	98.25	100.50	--
Average	20.65	20.10	19.65	20.10	--

Average of 10 plants.

3. Onion Variety / Fertilizer Trial.

Materials and Methods:-

A variety and fertilizer trial was superimposed on a commercial onion crop at Central Farm. The experimental design consisted of a randomized block with two levels of nitrogen (15 lbs N/acre and 30 lbs N/acre respectively), two levels of phosphorus (25 lbs P 205 and 50 P/205/acre respectively), one level of potash (20 lbs K 20/acre, and two varieties - Red creole and Yellow Grane F1 hybrid.

The trial was hand - weeded and mulched thrice, and was harvested in May.

Results and Discussions:-

Yields have not been statistically analysed as yet and as such it is not possible to draw any firm conclusions. However, it seems that the Red Creole variety is better adapted to our conditions than the Yellow Grane F 1 hybrid.

6. Cassava Fertilizer Trial

Introduction:-

A trial was laid down at Central Farm to determine the effects of different levels of Nitrogen and phosphorus on the growth of Cassava (*Manihot esculenta*).

Materials and Methods:-

The variety of Cassava used in the trial was "Blue Bell" Treatments were replicated four times and consisted of four levels of Nitrogen (0, 43, 64, and 86 lbs/acre). Nitrogen was applied in the form of urea and phosphorus as triple superphosphate.

The trial was hand-weeded and hoed to remove weeds. Leaf number was counted for five randomly selected plants per plot.

Results and Discussions:-

Major problems in this trial were the poor quality of seed material and damage by insect pest. In addition, the trials were destroyed by the flood waters of tropical storm 'Laura' and it was not possible to assess Final yields. The Cassava fly (*Lonchaea Chabbea*) larvae caused severe damage to buds and axes of older leaves. Damage to buds induced axillary leaf growth which may have resulted in higher root yields when compared with undamaged plants.

Fertilizer type and/or concentration appeared to have no significant effect on the number of sprouts per plant, leaf numbers, nor plant heights (see Table below):

Effects of Fertilizer Levels on Growth Habit of Cassava Variety 'Blue Bell' Three Weeks after Seeding

#	Nutrient/Acre	% Sprouting	Sprouts/Plant	Leaf #	Plant Height (cm)
	<u>N</u>	<u>P</u>			
0	0	0	42	1.4	18
0	0	0	35	1.6	18
43	0	0	39	1.5	20
43	46	0	35	1.2	17
43	0	46	33	1.5	16
64	0	0	36	1.4	18
64	46	0	45	1.5	22
86	0	0	26	1.4	18
86	46	0	36	1.5	20
86	69	0	36	1.3	18

7. Sweet Potatoe Variety Observation Trial.

Introductory:-

A variety trial was initiated at Central Farm on 10th August, 1971 with the objectives of characterizing the different varieties.

Methods and Materials:-

Four varieties Black Rock, C-19, Flagall, and M-23 were planted in six replicates in a completely randomized block design. Insect control was practiced by using Sevin and Dipterex alternately at 21 lbs/acre each application. A count of leaf number was carried out when the plants were six weeks of age.

Results and Discussions:-

A count of leaf number on five plants per plot, selected at random, indicated that the variety Flagall was the most vigorous with an average of 44 leaves. M-23 was next with 27% less photosynthetic area, and the varieties C-19 and Black Rock had approximately 45% less photosynthetic area than Flagall (see table on following page).

The trial was destroyed by flood water in November and could not be concluded.

Number of Leaves Per Plant at Six Weeks of Age
(Average of 5 plants/plot selection at random)

Variety	Block <u>I</u>	Block <u>II</u>	Block <u>III</u>	Block <u>IV</u>	Block <u>V</u>	Block <u>VI</u>	Average
Black Rock	32	40	16	10	23	15	23
C-19	25	30	41	16	43	19	29
M-23	52	39	36	18	25	21	32
Flogall	51	66	30	30	52	35	44

8. Soybean Fertilizer/Variety Trial.

Introductory:-

Research on soybeans (Glycine max) has so far been aimed at determining which varieties are best adapted to our conditions and the best time of planting. Little is ~~known~~ about the fertilizer requirements of the crop under local conditions and in order to gather some information on this aspect, an experiment with four levels of fertilizer was initiated on August 31, 1971.

Materials and Methods:-

The experiment entailed a split-plot design with fertilizer as the main treatment and varieties as a sub-treatment. The soybeans varieties used were F 62/3977, Acadian, Dan Pelican and Curtin. Seeds were inoculated with Nitrogen and treated with Farnasan prior to planting. The fertilizer used was 10:40:10 and the treatments consisted of 0, 24, 48, and 72 lbs per acre respectively. Seedling emergence was observed after two weeks and leaf count taken after five weeks.

Results and Discussions:-

The rate of seedling emergence was highly correlated with seedling vigour. The variety Dan had the lowest emergence (23%), while the other varieties each had approximately 50% emergence. Poor emergence was mainly due to low seed quality, and seed selection is of utmost importance in a good stand is to be realized. Dan and Curtin are short varieties (15-20 cm) while F 62/3977, Acadian, and Improved Pelican are tall varieties (20-37 cm.) Leaf number for 5 - week old plants ranged from 8 to 13 with no significant difference among varieties or fertilizer treatments. The table on the following page gives the percentage of maximum seedling emergence for the five soybean varieties at two weeks of age:-

Level of Fertilizer	Dan	F62/397	Acadian	Improved Pelican	Curtin
0 lbs./acre	23	48	50	50	52
24 " "	33	50	63	90	62
48 " "	24	36	54	54	58
72 " "	27	58	58	72	61

No seed yields obtained since the trial was completely destroyed by flooding in November.

2. PLANT PROTECTION RESEARCH:-

(1) SOIL INSECTICIDE TRIAL ON CORN

Objective:- To determine an effective and economic method of controlling soil insects which attack corn.

Materials and Methods:

The experiment design consisted of a completely randomized block of seven treatments replicated four times. Plots were 36 feet long and 18 feet wide, and the trial was laid down on the Riverside area of Central Farm on 11th August. The variety of corn used was the hybrid Poey T - 66 and the insecticide treatments were as follows:-

1. Lannate - 18 gms. in 4 gals of water/plot
2. Terracur P - 4 ozs./plot
3. Aldrin - 8 ozs/plot
4. Disyston - 4 ozs/plot
5. Birlane - 4 ozs/plot
6. Valaxon - 4 ozs/plot
7. Control - no insecticide

Six weeks after planting, a random sample consisting of 10% of the plants from each plot was obtained, the plants were measured, and average height computed for each plot. The yields from a random 10% sample of each plot was also recorded at harvest.

AVERAGE HEIGHT (INCHES) OF CORN PLANTS SIX WEEK AFTER PLANTING

Treatment	Block 1	Block 11	Block 111	Block 1V	Average	Average Height as a % of Con- trol
Valexon	20.4	24.0	23.3	23.4	22.8	90
Birlane	21.8	25.0	23.3	21.7	22.9	99
Control	21.2	28.0	24.0	19.2	23.1	100
Disyston	25.5	27.0	24.0	25.0	25.4	110
Terracur P	26.0	24.0	31.1	27.0	27.0	118
Aldrin	20.7	30.0	29.4	28.6	27.2	118
Lannate	32.2	36.4	36.4	33.0	34.5	149
Average	24.0	27.8	27.3	25.4	-	-

AVERAGE WEIGHT PER EAR OF CORN (gms.)

Treatment	Block 1	Block 11	Block 111	Block 1V	Average	Average Height as a % of Con- trol
Control	129.5	126.5	116.5	104.0	119.1	100.0
Birlane	163.0	132.0	139.5	101.0	134.0	112.4
Valexon	165.5	148.5	119.5	133.0	141.6	119.0
Terracurp	153.0	143.0	106.5	173.5	144.0	121.0
Aldrin	152.5	138.0	123.5	166.0	145.0	121.6
Disyston	163.5	178.5	145.5	164.5	163.0	137.0
Lannate	226.5	132.0	148.5	185.0	173.0	145.0

Lannate, Aldrin, and Terracur P seem to have significantly increased the heights of plants over the control. The fact that Lannate resulted in increased height of plants of almost 50% indicates that soil insects are important agents in the reduction of plant growth, and that Lannate is a very promising soil insecticide.

The Trial was harvested prematurely on 17th November due to wind damage, and the moisture content of the grains was high at 38%. However, the yield data agrees, in general, with that for plant height. Lannate proved to be the best treatment in this :

respect, closely followed by Disyston, Aldrin, and TerracurP.

(2) Rice Variety Trial

Objective:- To compare the performances of six CIAT varieties of rice obtained from Columbia against the four most popular varieties currently grown in the country.

Materials and Methods:-

The experimental design consisted of two blocks replicated twice. Block 1 was broadcast while block 11 was row-planted. The Trial was laid down at the Riverside area of Central Farm.

CIAT 1	CIAT 6
CIAT 2	Bluebelle
CIAT 3	Bluebonnet
CIAT 4	Saturn
CIAT 5	Starbonnet

Results and Discussions:-

YIELDS OF RICE PADDY (lbs.) BEFORE AND AFTER WINNOWING

Variety	BLOCK 1		BLOCK 11	
	Before Win- nowing	After win- nowing	Before Win- nowing	After Win- nowing
CIAT 1	32.87	26.94	9.00	8.50
CIAT 2	27.44	24.25	21.38	19.63
CIAT 3	3.50	3.25	7.06	6.75
CIAT 4	28.25	26.25	13.56	15.31
CIAT 5	16.25	13.13	27.56	26.00
CIAT 6	26.00	21.50	14.00	11.75
Bluebelle	32.87	26.94	9.00	8.50
Bluebonnet 50	27.44	24.25	21.38	19.63
Saturn	21.38	19.63	21.81	20.81
Starbonnet	12.69	10.87	19.25	18.25

DAYS TO MATURITY OF TEN RICE VARIETIES.

Variety	Days of Maturity
Bluebelle	110
Saturn	132
Starbonnet	132
Bluebonnet 50	137
CIAT 4	137
CIAT 1	143
CIAT 2	143
CIAT 3	143
CIAT 5	143
CIAT 6	143

(3) CORN STORAGE TRIAL (Ref. G.S 1/71)

Objectives:- To compare four methods of storing corn in order to determine the safest and most efficient method of protecting the grain against the corn weevil, Sitophilus Zeamais.

Experimental Design:- Completely randomized block with three replicates.

Materials and Methods:-

The treatments were laid out in heavy wooden - frame boxes covered a rot-proof building. The variety of corn used was the synthetic variety VS - 550 A. The initial moisture content was 18%, but it had stabilized at 14.2% after four months.

The main treatments were:-

- (1) Lindane (1% dust) at 85 gm/box - 1 lb. (1000 lbs).
- (2) Lime (powered limestone) 85 gm./box - 1 lb (1000 lbs)
- (3) Gardona (24% E.C.) at 50 mls. in a 2% solution/box.
- (4) Control-as treatment.

In addition the corn was stored in three forms:-

- (a) shelled corn - 12 boxes of 110 lbs each.
- (b) corn in the husks - 12 boxes of 145 lbs each.
(equivalent to 110 lbs. when shelled).
- (c) Peeled corn - 12 boxes of 110 lbs each.
(approximately equivalent to 110 lbs shelled corn)

The boxes were laid out in three rows 3 feet apart as follows:-

Row 1.	1b	4a	4c	3b	4c	2b	4a	2a	3b	3a	2c	3c
11.	3a	4b	2b	4c	1c	2c	1b	3c	3a	1a	3c	4b
111.	2c	1a	4b	2a	3b	1c	1a	2b	1c	1b	2a	4c

A. 1 lb sample, averaging 1773 grains per lb., from each of the four treatments, replicated three times for each of the three states of corn, was used and the number of live weevils and damaged grains in each sample was counted. Counts were started in August and terminated in February, 1972 when some of the controls had become completely destroyed by weevils. Results of monthly sampling are contained in tables on the following page.

Results and Discussions:-

Table VI

Counts of weevils and damaged grains: First Monthly Sampling.

Treatment	State of Corn	Avg. # of Weevils	Avg. # of Grains Damaged
1% Lindane	Shelled	1.7	2.7
	Husks	2.0	4.3
	Peeled	3.0	7.7
Lime	Shelled	8.0	15.0
	Husks	0.0	1.0
	Peeled.	0.0	0.7
2% Gardona	Shelled	3.0	13.0
	Husks	0.3	2.0
	Peeled	0.6	2.7
Control	Shelled	6.3	9.3
	Husks	0.7	4.0
	Peeled	0.0	0.0

■ A 1-pound sample from each of the four treatments replicated three times for each of the three states of corn was used and the number of live weevils in each sample determined.

TABLE VII

Counts of Weevils and Damaged Grains: Second Monthly Sampling.

Treatment	State of Corn	Avg. # of Weevils	Avg. # of Damaged Grains
1% Lindane	Shelled	2.0	19.0
	Husks	1.0	16.0
	Peeled	0.3	2.0
Lime	Shelled	21.0	43.0
	Husks	1.7	11.3
	Peeled	0.7	2.0
2% Gardona	Shelled	2.7	21.3
	Husks	2.0	9.3
	Peeled	3.0	17.0
Control	Shelled	15.7	33.3
	Husks	4.3	19.0
	Peeled	1.3	3.7

☼ A 1 - pound sample from each of the four treatments replicated three times for each of the three states of corn was used and the number of live weevils in each sample determined.

CORN STORAGE TRIAL

October, 1971

TABLE VIII

Counts of Weevils and Damaged Grains: Third Monthly Sampling.

Treatment	State of Corn	Avg. # of Weevils	Avg. # Damaged Grains
Lindane (1%)	Shelled	20.0	14.0
	Husks	0.0	2.0
	Peeled	0.0	4.0
Lime	Shelled	190.0	320.0
	Husks	4.0	32.0
	Peeled	2.0	6.0
Gardona (2%)	Shelled	33.0	18.0
	Husks	1.0	7.0
	Peeled	2.0	6.0
Control	Shelled	14.0	132.0
	Husks	3.0	35.0
	Peeled	6.0	28.0

A 1-pound sample from each of the four treatments replicated three times for each of the three states of corn was used and the number of live weevils in each sample destined.

CORN STORAGE TRIAL

November, 1971.

TABLE 1X

Counts of Weevils and Damaged Grains: Fourth Sampling.

Treatments	State of Corn	Avg. # of Wee- Vils	Avg. # of Graind Damaged
Lindane (1%)	Shelled	197.0	129.0
	Husks	21.0	91.0
	Peeled	10.0	16.0
Lime	Shelled	744.0	905.0
	Husks	37.0	124.0
	Peeled	23.0	127.0
Gardona (2%)	Shelled	153.0	66.0
	Husks	13.0	33.0
	Peeled	7.0	4.0
Control	Shelled	146.0	781.0
	Husks	34.0	148.0
	Peeled	7.0	156.0

CORN STORAGE TRIAL

December, 1971.

TABLE X

Counts of Weevils and Damaged Grains: Fifth Monthly Sampling.

Treatments	State of Corn	Avg. # of Weevils	Avg. # of Damaged Grains
Lindane (1%)	Shelled	46.3	954.7
	Husks	36.0	52.3
	Peeled	51.7	91.3
Lime	Shelled	193.3	1,640.0
	Husks	84.7	144.7
	Peeled	398.0	959.0
Gardona (2%)	Shelled	19.0	291.0
	Husks	6.3	13.0
	Peeled	28.0	70.0
Control	Shelled	223.0	1,749.7
	Husks	15.3	43.0
	Peeled	91.7	300.0

CORN STORAGE TRIAL

January, 1972

TABLE XI

Treatments	State of Corn	Avg. # of Weevils	Avg. # of Damaged Grains
Lindane (1%)	Shelled	200.0	645.0
	Husks	5.0	57.3
	Peeled	8.0	168.0
Lime	Shelled	-	-
	Husks	5.3	69.7
	Peeled	56.7	1,623.0
Gardona (2%)	Shelled	-	-
	Husks	3.3	87.3
	Peeled	14.3	253.7
Control	Shelled	-	-
	Husks	63.7	444.0
	Peeled	22.3	1,215.0

Blank entries are treatments discarded because of 100% damage by weevils.

CORN STORAGE TRIAL

TABLE X11

February, 1972.

Counts of Weevils and Damaged Grains: Seventh Monthly Sampling.

Treatments	State of Corn	Avg. # of Wee- vils	Avg. # of Damaged Grains
Lindane (1%)	Shelled	1178.0	1366.0
	Husks	5.3	39.3
	Peeled	3.3	209.0
Lime	Shelled	-	-
	Husks	18.7	84.3
	Peeled	-	-
Gardona (2%)	Shelled	5.7	502.0
	Husks	11.3	130.3
	Peeled	3.0	141.7
Control	Shelled	-	-
	Husks	20.0	153.5
	Peeled	-	-

Blank entries are treatments discarded because of 100% damage by weevils.

CORN STORAGE TRIAL.

1971 - 1972

TABLE X111

Counts of Weevils and Damaged Grains: Average for Seven Months.

Treatments	State of Corn	Avg. # of Wee- vils	Avg. # of Grains
Lindane (1%)	Shelled	235.0	432.9
	Husks	10.0	37.4
	Peeled	10.9	71.0
Lime	Shelled	671.8	924.9
	Husks	21.6	66.6
	Peeled	322.3	640.9)
Gardona (2%)	Shelled	32.2	179.8
	Husks	5.3	40.3
	Peeled	8.3	70.7
Control	Shelled	565.8	893.4
	Husks	20.1	120.9
	Peeled	271.6	496.5

Based on these results the following conclusions can be drawn VS 550 A at a moisture content of 18% at time of storage:-

- (1) Shelled, untreated corn is completely destroyed in 5 months and peeled untreated corn in 6 months. Untreated corn in the husks is not severely damaged up to seven months.
- (2) Untreated corn in the husks kept better than shelled treated corn,
- (3) There was no significant difference between the damage suffered by corn treated with lime and the control. Therefore, lime has little or no effect at the rate used.
- (4) There was no significant difference between the control of weevils on corn in the husks and peeled treated with Gardona or Lindane, but there was a significant difference between the two when treated with lime and in the control.
- (5) The Gardona treatment proved significantly more effective than Lindane in controlling weevils on the shelled corn. It was also slightly more effective than Lindane on corn in the husks and peeled corn.
- (6) The best treatment was Gardona to corn in the husks.

APPENDIX 111

SLAUGHTER RETURNS, 1971.

		CATTLE			PIGS	
DISTRICT	No.	Dressed Wt.(lbs)	Average Dressed Wt.(lbs)	No.	Dressed Wt.(lbs)	Average Dressed Wt.(lbs)
Corozal	265	79,182	298.8	111	10,511	94.7
Orange Wa Walk	239	71,402	298.8	777	73,572	94.7
Belize	3, 199	1,150,046	359.5	6,308	531,715	84.3
Cayo	483	133,902	277.2	984	85,207	86.6
Stann Creek	166	53,748	323.8	135	14,537	102.7
Toledo	38	12,024	316.4	211	13,583	64.4
TOTALS	4,390	1,500.304	341.8	8,526	729,125	85.5

APPENDIX IV

IMPORTS OF DAIRY PRODUCTS (1971)

Product	Volume ('00lbs.)	Value B.H. \$)
Milk and Cream, fresh	9,320	263,930
Milk and Cream, Evaporated and Condensed	56,940	2,082,798
Milk and Cream, powdered	17,656	612,062
Butter	7,138	545,887
Cheese	19,923	1,066,957
TOTAL, dairy products.	110,977	4,571,634

NOTE Provisional data supplied courtesy of the Customs Department.

APPENDIX V

DISTRIBUTION OF SENIOR STAFF - 31ST DECEMBER, 1971.

<u>POST</u>	<u>NAME</u>	<u>DIVISION</u>
Chief Agricultural Officer	E. W. KING	Administration
Principal Agric, Officer	A. L. Navarrete	"
" " "	G. C. Ellis	Extension (Crops)
Agricultural Officer	R. S. Pitt	Administration
" "	D. E. Belisle	"
" "	N. E. Wade	Crops Research
" "	N.J. Arzu	Crops Extension
" "	L. B. Frutos	Mechanical
" "	R. H. Neal	Livestock
" "	C. G. Santos	Livestock
Livestock Officer	E. E. Juan	"
" "	O. O. Orio	"
Veterinary Officer	G. Calderbank	"
Veterinary Officer	B. M. Silva	"
Plant Pathologist	J. E. Link	Crops Research
Agronomist	J. P. Cal	" "
Mechanical Superintendent	N. E. Mc. Kenzie	Mechanical
Farm Planning Officer	M. E. Avila	Crops Extension
Asst. Agric, Officer	T. L. Brackett	" "
" " "	A. P. BAUTISTA	" "
" " "	F. B. ARANA	" "
" " "	H. A. Reyes	Livestock
" " "	A. R. Tzul	Livestock
" " "	U. Y. Miranda	Crops Research
Administrative Assistant.	S. I. Goff	Administration
Accountant	L. Usher	"

APPENDIXY 1

LABORATORY EXAMINATIONS : 1971.

[illegible]

APPENDIX VII

CLINICAL CASES 1971

-34-

	HORSE	CATTLE	SHEEP	PIGS	DOGS	CATS	POULTRY	OTHER	TOTAL
Ectoparasites	65	483		63	2	1	-	-	614
Endoparasites	76	228	59	262	50	3	802	-	1480
Enteritis	1	25	6	48	11	-	-	-	91
Mastitis	2	11	-	-	-	-	-	-	13
Piroplasmosis	4	33	-	-	-	-	-	-	37
Anaplasmosis	-	36	-	-					36
Resp. Infection	8	125	1	18	23	1	-	1	177
Eye Infection	21	78			2	-	25	2	128
Ear Infection	1	6	-	2	5	2	-	-	16
Allergy	6	-	-	-	5	-	-	-	9
Distemper	-	-	-	-	35	-	-		35
Pyometra		3	1						4
Leptospirosis					24				24
Salmonellosis		15							15
Fowl Cholera	-	-	-	-	-	-	-	#	#
Fowl Coryza	-	-	-	-	-	-	48	-	48
Photosensitization		5	-	-	-	-	-	-	5
Nephritis	-	-	-	-	-	-	-	-	-
Tonsillitis	-	-	-	-	-	-	-	-	-
Gastritis	-	-	-	2	-	-	-	-	2
Leukosis	-	-	-	-	-	-	400	-	400
Joint Ill	-	8	-	-	-	-	-	-	8
Abortion	-	1	1	-	-	-	-	-	2
Poisoning	6	53	-	12	3	-	-	-	74
Miscellaneous	913	477	23	408	219	5	381		2426
VACCINATIONS:									
a) Rabies	10	150	-	3	100	2	-	-	265
b) Distemper	-	-	-	-	32	-	-	-	32
c) Swine Fever	-	-	-	164	-	-	-	-	164
d) Leptospirosis	-	-	-	-	28	-	-	1	29
V.E.E.	233	-	-	-	-	-	-	-	3233
SURGERY:									
Caesarean Section	-	2	-	3	-	-	-	-	5
Dystocia	1	1	-	4	-	-	-	-	6
Retained Placenta	-	11	-	-	-	-	-	-	11
Gastration	1	34	3	82	7	3	-	-	130
Injury	21	12	1	3	27	-	27	-	91
Pregnancy Test	-	318	-	-	-	-	-	-	318
TOTAL	4369	2115	95	1074	571	17	1683	4	9928

several flocks

APPENDIX VIII

DISEASE FOUND AT MEAT INSPECTION : 1971.

DISEASE	SPECIES		
	CATTLE	PIGS	SHEEP
Tuberculosis	2	11	
Tumours, Benign (simple	7	23	
Melanosis	1	372	
Liver (a) Cirrhosis	6	1,447	
(b) Telangiectasis	40	7	
(c) Fatty Infiltration			
Abscesses	37	88	
Pneumonia	105	77	
Metritis acute, septic	13	28	
Parasitic Infection			1
(a) Ascaris spp.	2	29	
(b) Steph. dentatus	28	1787	
(c) Cysticercus	1	9	
(d) Lung Worms	26	707	
(e) Miscellaneous		166	
Icterus		3	
Imperfect Bleeding	33	17	
Congestion of lungs	141	83	
Bruising extensive and severe	20	10	
Necrosis (a) Lungs	317	743	
(b) Liver	7	261	
Hydronephrosis	16	66	
Pyrexia		11	
Hepatitis		84	

APPENDIX 1X

AGRICULTURAL EXPORTS - 1971.

<u>ITEM</u>	<u>UNIT</u>	<u>QUANTITY</u>	<u>VALUE(B.H.\$)</u>
Live Cattle	no	26	9,879
Live Sheep	no	4	63
Live Swine	no	1,587	162,148
Live Poultry	no	46,604	80,881
Red Kidney Beans	lbs	72,250	14,704
Plantains	bunches	537	182
Eggs	dozs.	31,495	15,260
Oranges, fresh	lbs	1,306,560	27,284
Tangerines Fresh	"	400	9
Grapefruit Fresh	"	1,282,305	540,543
Limes, Fresh	"	1,600	35
Coconuts Fresh	nuts	107,200	8,901
Other Fresh Fruit	lbs.	2,150,248	51,285
Dried Fruit	"	232,985	113,309
Orange Juice	"	12,791,771	1,585,388
Grape Fruit Juice	"	2,900,671	288,504
Orange Concentrate	"	4,303,513	1,205,793
Grapefruit Concentrate	"	785,200	263,338
Grapefruit Sections	"	1,930,200	405,500
Orange Oil	"	116,192	91,927
Pepper & Pimiento	"	26,560	31,800
Maize	"	20,000	1,000
Raw Sugar	tons	58,139	13,459,886
Molasses	tons	26,520	952,720
Natural Honey	tons	206,573	46,200
Peanuts	lbs.	92	30
Cucumbers	"	9,123,638	215,911

APPENDIX II
METEOROLOGICAL DATA 1971

AV. MONTHLY MAXIMUM TEMP. °F													
Month	Bze. Int'l Airport	S.J.C. Land-ivar	Yo Creek S station	Ambergris Caye	Cabbage Haul	Melinda Station	Central Farm	Augustine M.P.R.	Cooma Cairn	Savannah For.Stat.	S/Creek Agstat	Big Falls	P.G. Agstat
January	82	83	79.6	86	83	86	83	83.2	72.4	83	82	83	N.A.
February	83	83.7	75.3	85	82.5	87.4	82	85	77	83.3	82.8	84.8	N.A.
March	84	85.5	75.6	84.4	84	89	87	87.6	78.4	85.9	85.5	87.3	N.A.
April	85	81.7	75.8	84.9	90.6	91.6	88	89.1	80.6	86.1	84	88	N.A.
May	89	88.8	78	87.8	91	91.4	93	92.6	83.3	92.3	87	93	94.1
June	87	87.4	82.7	87	86.8	90.4	88.1	87	79	92.8	87	89	81.0
July	86	86.4	79	86.5	87.9	89.3	85	86.8	77.1	90.6	86	88.7	79
August	87	87.9	79.5	88	88.1	91	87	87.5	76.3	90.5	87.1	89.0	81.2
September	88	87.6	78.3	88.2	89.1	92.1	88	88.5	80.9	91.5	87.4	90.0	82.1
October	86	86.4	75	88.7	88	92	87	95.9	76.5	89.1	86.9	88	80.5
November	84	83.1	73.3	86.1	75.6	89.3	85.2	82.1	73.1	84.4	--	88.2	77.7
December	83	83.6	79.3	83.7	86.4	87.1	84	84.1	72.7	--	--	86.0	77.4
Average Monthly Minimum Temperature °F													
January	68	69	61.1	74	68	71	69	59.6	60.3	69	64	70	N.A.
February	69	71.3	N.A.	73	65	71.3	69	61	60	69.6	64.5	69	N.A.
March	69	74.6	49.8	73.5	67.8	72	62	59.3	61.8	72.6	67	75	N.A.
April	71	73.9	52.7	72.8	68.4	72	65	61.5	62.3	66.6	65	70.1	N.A.
May	73	78.6	55.6	76.2	69.3	76.5	68	66.5	66.0	74	71	77	68.8
June	76	79.1	52	78	70.1	76.9	71	67.7	65.8	75.3	70	75	68.8
July	75	77.2	N.A.	77.2	68.6	75.7	69.8	66.4	62.1	74.5	74	76	68.7
August	75	69.9	N.A.	78.3	73	75.2	69.5	67.4	66.0	75.1	70	75	69.0
September	76.2	77.4	N.A.	79.7	75.9	77	71	68.9	66.7	74.6	70.5	76.4	68.9
October	73	75.1	N.A.	77.5	76.2	75.5	67	66.3	64.9	73.3	68.5	75.0	89.0
November	71	71.4	N.A	75	69.3	72.8	68	65.6	62.4	70.0	--	76.0	N.A
December	72	73.2	N.A	75.7	75.3	73.6	69	63	62.5	--	--	71	N.A.

RAINFALL RECORDS: 1971*

District & Station	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL	'71	TOTAL	'70 Ten Year Annual Average
<u>COROZAL</u> Corozal Agstat (San Andres)	0.35	0.00	0.53	4.25	1.98	8.55	7.61	9.90	3.12	2.67	7.58	11.52	58.06		N.A.	N.A.
<u>ORANGE WALK</u> Hill Bank Yo Creek Agstat	2.39 1.07	0.00 0.98	0.65 0.61	1.06 0.4	1.07 4.35	8.04 6.96	11.06 4.65	7.47 7.74	3.51 4.87	4.40 4.03	10.76 5.17	5.86 5.10	56.27 46.37		57.21 49.65	52.29 (6) 55.77 (7)
<u>BELIZE</u> S.J.C. Landivar Bze. Int'l Airport	2.27 3.14	0.88 1.19	2.67 4.18	0.47 1.03	1.72 0.80	6.08 7.09	5.08 7.64	9.08 9.05	3.66 5.77	6.11 6.10	15.82 13.76	3.40 3.50	57.24 63.25		60.91 69.06	69.05 (7) 72.24
Gracie Rock	4.02	0.05	2.80	1.05	1.23	6.82	3.86	13.27	5.03	8.29	13.61	5.85	65.88		73.11	66.13
Churchyard	3.90	0.65	3.10	1.24	2.40	13.12	18.76	13.98	6.10	4.17	13.10	3.57	84.09		93.79	N.S.
Maskall	2.13	0.10	1.28	1.56	2.15	5.05	7.96	10.12	4.04	4.13	10.53	8.51	57.56		57.44	68.21
Big Falls	2.71	0.67	4.44	0.33	0.99	11.11	7.74	8.14	5.97	4.21	10.01	3.61	60.01		79.44	69.55 (6)
Ambergris Caye	1.19	1.57	1.67	1.50	0.47	2.85	3.52	7.22	1.84	6.15	12.50	10.07	50.55		52.98	58.60 (7)
<u>STANN CREEK</u> Stann Cr. Agstat	5.49	1.78	2.80	3.96	2.20	11.70	11.30	12.34	8.69	8.44	9.49	N.A.	N.A.		80.37	N.A.
Pomona	4.75	2.17	3.06	3.07	1.20	13.93	20.71	13.33	6.80	5.92	15.28	N.A.	N.A.		101.57	N.A.
Melinda Estates	3.13	2.28	2.54	2.44	1.30	8.60	7.25	13.55	8.66	8.81	12.38	4.14	75.08		72.22	N.S.
Alta Vista	6.25	2.50	3.24	4.35	1.34	13.14	14.22	15.44	5.41	6.08	14.41	6.99	93.37		105.75	N.A.
Cabbage Haul	3.19	2.62	2.57	1.31	2.71	10.68	10.88	14.60	8.66	11.99	8.93	5.99	84.13		86.88	N.A.
Savannah For Station	5.44	5.05	1.95	1.08	3.75	9.90	7.02	20.83	11.46	9.26	9.08	N.A.	N.A.		100.50	N.A.
Middlesex	4.35	2.16	3.84	4.58	2.51	14.72	17.10	12.96	7.72	6.84	16.50	8.54	101.82		114.35	108.22
<u>TOLEDO</u> Toledo Agstat. Machaca	4.87 8.83	5.86 2.17	0.21 5.70	0.24 1.10	0.00 3.18	41.31 32.33	38.94 28.50	34.14 23.78	20.45 14.01	9.55 7.64	6.70 5.12	4.30 6.79	166.57 139.15		138.11 184.92	142.78 133.88

(*) Rainfall figures in inches
 (**) Figures in brackets indicate no. of years actually averaged

APPENDIX 1

RAINFALL RETURNS; 1971*

District & Station	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	Total	'71	Total	'70	Run Year Annual Average **
<u>CAYO</u>																	
San Ignacio	2.93	0.66	1.94	1.00	2.30	2.57	8.79	3.52	2.74	3.84	11.47	2.74	44.50		54.23		61.57 (7)
Central Farm	3.33	0.98	2.24	0.50	1.28	5.00	9.06	4.94	3.88	3.88	12.08	6.85	54.00		51.31		57.14
Norland	3.45	0.81	2.65	0.43	1.76	5.10	11.17	5.36	3.20	3.45	13.35	4.19	54.92		60.91		57.51
Belmopan	3.18	0.79	7.04	1.32	0.70	8.36	19.05	8.30	7.29	3.88	17.52	5.37	83.16		98.84		87.05 (4)
Beaver Dam	3.43	0.76	2.89	2.18	1.75	7.36	14.37	7.93	3.99	4.26	12.93	7.52	69.27		108.86		94.77 (3)
Roaring Creek	2.28	1.09	4.69	2.02	0.68	6.93	13.92	7.20	4.46	1.83	11.74	3.92	60.76		86.93		79.28 (3)
Cave Branch	4.08	1.35	4.10	3.75	2.40	11.04	15.75	9.13	8.17	8.18	14.71	6.76	89.24		93.74		91.54 (2)
Roaring River	4.84	1.38	4.77	1.46	1.90	7.21	18.25	7.13	5.26	2.02	14.82	3.92	72.96		N.S		N.S
Hummingbird Sibun	4.14	2.13	4.78	2.43	3.16	13.00	16.23	10.95	7.60	7.69	15.54	5.26	92.91		108.08		106.96 (3)
Augustine M.F.R.	2.22	1.02	2.35	1.12	3.72	4.09	6.90	5.67	3.29	3.42	13.00	1.71	48.51		64.03		60.86
Cooma Cairn	1.80	1.84	4.73	2.09	3.61	6.55	10.83	5.66	8.24	4.43	18.42	5.90	74.10		79.67		82.11
Spanish Lookout	2.01	0.40	3.71	0.49	1.44	7.48	13.96	8.97	2.86	4.32	8.30	4.57	58.51		58.56		64.12 (3)
Pilgrimage Valley	2.73	0.53	2.38	1.00	3.23	4.64	9.54	4.39	3.38	3.07	12.16	2.80	49.85		N.S		N.S.
Cadena Creek	2.80	0.40	3.90	0.20	1.50	4.80	8.00	5.06	1.90	2.30	7.40	3.00	41.26		53.00		47.10
Benque Viejo	1.37	0.69	4.94	0.47	3.27	6.43	6.44	3.25	N.R.	4.43	11.46	1.85	N.S.		54.10		N.S
Aguacate Lagoon	1.90	0.70	1.20	1.10	1.40	5.30	16.40	5.70	3.00	4.60	9.70	3.50	54.50		60.00		58.45 (2)

(*) Rainfall figures in inches
 (**) Figures in brackets indicate no. of years actually averaged

APPENDIX 11

METEOROLOGICAL DATA 1971

Month	AV. MONTHLY MAXIMUM TEMP. °F											
	Bze. Int'l Airport	S.J.C. Land- ivar	Yo Creek Station	Amberg Caye	Cabbage Haul	Melinda Station	Central Farm	Augustine M.P.R.	Cooma Cairn	Savannah For. Stat	S/Creek Agstat	Big Falls P.G. Agstat
<u>Ave. Monthly Humidity</u>												
January	83%	85%		%	92%	91%	91%	84%	87%	80%	83%	85% N.A
February	75%	83%	83%		88%	91%	89%	82%	87%	82%	82%	81% N.A
March	73%	80%	89%		89%	88%	88%	75%	81%	74%	84%	77% N.A
April	77%	80%	89%		89%	80%	77%	71%	71%	66%	84%	80% N.A
May	69%	76%	88%		83%	79%	69%	66%	74%	69%	91%	88% 83%
June	80%	77%	87%		88%	80%	79%	75%	79%	75%	89%	92% 87%
July	79%	76%	87%		86%	83%	85%	80%	84%	76%	88%	83% 88%
August	77%	78%	89%		92%	80%	84%	80%	81%	78%	81%	90% 86%
September	78%	83%	85%		88%	84%	85%	76%	80%	78%	84%	83% 86%
October	78%	85%	78%		84%	87%	85%	74%	81%	80%	80%	87% 85%
November	90%	97%	83%		91%	91%	89%	89%	92%	80%	87%	87% 93%
December	81%	85%	88%		92%	87%	86%	88%	88%	82%	86%	95% 90%

Introduction:

The policy in the Pasture Introduction Block remains the same - that of, cutting grasses at their time of maturity, this being generally after 6-8 weeks of regrowth depending on weather conditions.

Results and Discussions

Following are the results of harvests and analysis of grasses over a period of approximately 2 years. Yield is given in cwt/acre total crude protein. The last date of harvest included in this report is 6th October, 1970.

TABLE # 1Crude Protein Yield (Cwt/acre)

Code	Sample	No. of Harvest	Grand Total Yield	Av. Yield per cut.
G-19	Scrobic Grass	16	65.51	4.09
G-46	Paspalum	11	69.06	6.28
G-48	Green Panic	15	38.83	2.59
G-49	Biloela Buffel	15	82.76	5.52
G-50	Creeping Guinea	13	44.31	3.41
G-51	Gatton Panic	16	42.28	2.64
G-52	Piano Grass	9	42.23	4.70
G-53	Buffel Grass (64.063)	7	20.70	2.96
G-54	Buffel Grass (64.062)	9	17.59	1.95
G-55	Napier Enano	11	122.61	11.14
G-56	Buffel Grass (64.060)	9	24.25	2.90
G-57	Buffel Grass (64.061)	2	1.83	0.92
G-58	Kikuyu Grass	2	11.42	5.71
G-59	Signal Grass	10	47.96	4.79
G-60	Embu	8	18.09	2.26
G-61	Lovington Grass	11	20.29	1.84

The performance of the above-mentioned grasses in terms of crude protein yield per acre shows the following grasses to be performing best:-

Napier Enano	-	<u>Pennisetum purpureum</u> (var)
Paspalum	-	<u>Paspalum</u> <u>plicatulum</u>
Biloela Buffel	-	<u>Cenchrus ciliaris</u> (var)
Signal Grass	-	<u>Brachiaria brizantha</u>
Piano Grass	-	<u>Ischaemum aristatum</u>

The performance of Kikuyu grass is apparently good but must be discounted in view of the fact that it was harvested only twice at widely separated intervals. In fact, this grass grows very reluctantly under conditions at Central Farm and is now almost completely over-run by other grasses. A final report will be made on these grasses at the end of 1972.

Some points of interest may be mentioned here. The performances of the grasses mentioned above have been persistently good and visual observation of their lush growth has always been favourable. A grass that gave good results in analysis of crude protein percentage was Lovington Grass (*Boutelous gracilis*); this grass averaged 9.8% C.P. over nine consecutive cuts. Unfortunately, its low stand and light quality pulled down its total crude protein yield per acre.

Mention should also be made of seven other grasses which had their first harvests in 1970. Of these seven, six were imported from Australia and one from Honduras. These grasses are as shown below with the information of their source and performance until 6th October, 1970.

TABLE 11
Yield Crude Protein (Cwt/acre)

Source	Sample	No of Harvest	Grand Total Yield	Average Yield/cut.
Australia	Kennedy Ruzil	4	24.79	6.20
"	Scrohic Grass	2	7.11	3.56
"	Tarrawubbabar Buffel	5	41.90	8.38
"	<u>Paspalum plicatum</u>	5	32.40	6.48
"	Rhodes Grass	5	11.06	2.21
"	Buffel U.S.A	4	6.16	1.54
Honduras	Aleman	1	2.53	2.53

Visual observation of growth also coincides with the actual performance of these grasses. Tarrawinnabar Buffel is capable of very quick regrowth and also stands high above the other grasses; and Paspalum plicatum performs persistently well in its yield and nutritive status.

All these plots received Urea at 95 lb/acre equivalent after each cut with phosphate (Triple super phosphate) and potash (Muriate of Potash) applied twice during the year. Total phosphate and potash applied for the entire year are 138 lb. and 120 lbs. respectively.

2. Grass Species Trials

Introduction and Objectives

In 1966, the Agronomist at Central Farm laid down some small plots of grasses (12 x 12') in the area now referred to as the Pasture Introduction Block. Since that time a few more grasses have been introduced to this area and regular harvesting, weighing, sampling and chemical analysis have been conducted since 1967 to date. On the basis of these "observations" which were reported in the 1969 Annual Report on Pasture Research, the Pasture Officer chose to work further with some ten grasses of the original introductions.

These grasses either because of their high yield of crude protein or because of their common use in the country and/or in specific areas have been laid down in small trials at three sites. The objective of this trial is to determine the performance of different grass species (and varieties) under similar treatment conditions.

The three sites chosen were Central Farm on alluvial clay loam, Hattievillie Commission of the Churches on Coastal Deposit and Yo Creek Agstat on lime enriched sandy clay.

Treatments

Listed below are the grasses which are being used in this trial.

Jaragua grass	(hyparrahenia rufa)-
Pangola grass	(Digitaria decumbens)-
Carib grass	(Eriochloa polystachya)-
Guinea grass	(Panicum maximum)-
Hamil grass	(Panicum maximum(Var.)).
Kazungual	(Setaria spaelata)-
Nunbank Buffel	(Cenchrus ciliaris(Var.)).
Bioloela Buffel	(Cenchrus ciliaris(Var.))
Molopo Buffel	(Cenchrus ciliaris(Var.))
Gayndah Buffel	(Cenchrus ciliaris(var.))
Pasto Rico Bermuda	(Cynodon Dactylon (Var.)).
Nandi Setaria	(Setaria spaelata)-
	Hattievill only.

Yo Creek Replication

This trial at this site was planted on 13th August using raised beds. Replanting had to be done subsequently for Carib grass, Pangola grass and Kazungulu which have since obtained very good stands. Observation of this trial on 15th September showed very good coverage and growth by all the buffels and Pasto Rico Bermuda. The heights of these grasses on 30th September was 24" and 15" respectively.

On 27th October, this trial was observed to be heavily infested with weeds, the most common weeds were *Leptochloa virgate*, *Kanchim* (*Panicum Spp*) and *Desmodium tortuosum*. At this time it was also observed that Pangola grass was attacked by rust and Pasto Rico by Brown Leaf Spot.

The first cutting of the trial was done on 9th November. Observation of the plots on 17th December, showed them to be in a very weedy condition. It is believed that unless more careful management is allotted this trial, no useful information will be obtained.

The soil at this site is a recently developed lime enriched sandy clay. This soil should be able to produce quite satisfactory crops of corn and beans in combination with a long pasture rotation. Whereas this soil should be able to produce quite satisfactory crops of corn and beans in combination with a long pasture rotation. Whereas this soil can become very sticky and unfavourable for cultivation under heavy rainfall conditions, its sandy property reduces stickiness to a large extent under normal rainfall conditions. It is considered that very satisfactory pastures can be grown on this soil at the Yo Creek Agstat.

Central Farm Replication

This trial was planted on 5th July on land which was heavily infested with the nut grass weed (*Cyperus rotundus*). Because of this fact spraying had to be done on three separate occasions using 2-4, D Amine.

Observation of this trial on 16th August showed that germination was generally good. There was need, however, to supply Carib, Pangola, Kazungulu, Jaragua, and Pasto Rico grass; the latter had to be supplied several times before a satisfactory stand could be achieved. On this same date, six weeks after planting, the buffels were 18" tall and Hamil grass 14" high.

The trial was cut for the first time on 13th October, but no samples were taken because there were no drying facilities. This trial was subsequently cut twice more during the year; on 19th November and 22nd December.

After the first cut all plots were fertilized with a mixture of Urea at 3.7 oz, Triple superphosphate at 3.7 oz. and Muriate of Potash at 2 oz. Subsequent cuts have received Urea at 3.7 oz per plot.

Rust was first noted on Pangola grass on 19th November and one day later heavy rains flooding occurred. Trial, however, was not damaged.

There has been rather rapid growth and regrowth of the grasses in this trial and the establishment period has been quite short. This soil is an alluvial clay loam with very good fertility status. This land can therefore be subject to intensive grazing rotations in combination with cropping to corn, beans and rice. The growth of grass so far has been very encouraging.

Hattieville Replication

This trial was planted on 2nd July on a well prepared seed bed using four blocks and 12 grasses. Very good germination was obtained for all plots except that of Carib grasses.

Observation of the trial on 17th and 21st August, showed that all seedlings had dried out; and the most likely cause of death was waterlogging. The trial was replanted on 23rd September, using only three blocks because of a shortage of seeds. On 26th, all plots received a complete fertilizer application of 7.4 oz. Urea, 3.7 oz. Triple superphosphate and 3.7 oz Muriate of Potash, this being equivalent to the N₂ P₂ K₂ treatment of the Pangola Fertilizer Trial in the Mountain Pineridge.

Quite satisfactory germination was obtained from this trial. In November, when this replication was harvested, the frog hopper grub was present in the plots of Pangola grass, Biloela and Molopa Buffel and Kazungulu Setaria, armyworm in Kazungulu, Mamil, Jaragua and Guinea grass and leafhoppers in almost all plots. The trial was sprayed with Lannate at 1 oz. per gal. water to control those insects; control was very good.

The first cut was done on 24th November and fertilized with Urea at 7.4 oz. per plot; no samples were taken as there were no drying facilities.

The soil at this site is a coastal deposit with a shallow top soil of a sandy silt texture and acid in nature. There are some features of this site which are very prominent.

First of all, with its present natural vegetation, this soil can only be used for range grazing where least would require 5-10 acres for maintenance or production.

Disturbance of the soil by ploughing, harrowing, etc. will probably introduce problems in water relation in the form of impeded drainage and waterlogging. For this reason, it may be necessary to use cambered beds which have a gradient from one to the next to carry away water. Whereas the natural grasses in this area are fairly strong rooted, the improved grasses in this trial are not generally so favoured. As a result, it may be necessary to promote strong rooting of these grasses for grazing purposes by allowing a long period for establishing and/or adopting a liming programme with use of phosphate fertilizer.

Conclusion

These replications Grass Species Trial will be completed in 1973/74 depending on the results. Meanwhile, more replications will be put down in other areas and on different soil types. No conclusive results have yet been obtained and whatever appears here are only in the nature of observation.

Pangola Fertilizer Trial (Pineridge)

Reports on this trial have so far included information on observations up to 2nd November, 1970 and harvests up to 19th November, 1970.

During 1971, the broadleaf weed *Emilea coccines* continued to be prevalent and weeding had to be done on four separate occasions. Hand weeding (i.e. pulling of weeds) was done on 18th January, 6th April and 4th June. Spraying once (18th March) with 2 4-D for control of this broadleaf weed. This spraying was 70% successful and eliminated the need for extensive weeding thereafter.

There were two incidents of insect attack and two of the rust fungus during 1971. Leafhoppers attacked these plots in January but the trial was cut on 2nd February and so there was no need for spraying. A spraying with *Metasystox* was done on 19th March to control aphids which had attacked this trial. A rate of 15 c.c per 3 gal. water was 100% successful. The trial was infested twice during the year with the rust fungus, these being on 29th April and 20th December; no control measures were taken as the infestation was only slight.

A total of six cuts were made during 1971. It was quite noticeable that cuts were able to be carried out at approximately six weekly intervals during the wet season. But during the dry season only a cut or two were done during the dry. There was also visual symptoms of strong phosphate deficiency during the drought. These deficiency symptoms were realized on application of triple superphosphate fertilizer. It was also observed that there was a definite relief of deficiency symptoms in the grass plots when the rains commenced in June; at this time no phosphate fertilizer was applied.

These two facts seem to beat out that the soil did contain a supply of phosphorus but this was unavailable during the dry because of the lack of sufficient moisture. The physical nature of this soil also points to the fact that water is quickly lost from the top horizon leaving an area where moisture is lacking and plant roots unable to penetrate into the hard clay horizon below. Therefore, it would be better fertilizers in small small quantities and frequent applications rather than in large and few applications.

There was a fire in the Soils and Tissue Laboratory of the Agronomy Division and the fire destroyed the samples taken from the 8th cut of this trial (8th September, 1971). No samples were taken from the 9th cut as no drying facilities were available. Subsequently a new drying cabinet was constructed and samples were presently being collected, dried and analysed.

The fertilizer treatments on this Pangola Trial were stated in Annual Report, 1970.

An examination of results to date indicates that some definite trends are appearing. For example, the plots receiving a complete fertilizer treatment are yielding much better than those receiving only one or two elements. There does not appear to be any definite response to nitrogen levels alone; but there is response to nitrogen when this element is applied along with phosphorus or potash. For example, this may be seen from the average yield of the following.

N1	P1		42.1	N1	P2	-	45.8
N2	P1		42.9	N2	P2	-	56.1
N3	P1		50.8	N3	P2	-	56.0
N1	P1	K1	54.0	N1	P2	K2-	73.5
N2	P1	K1	58.1	N2	P2	K2-	86.5
N3	P1	K1	- 63.3	N3	P2	K2-	96.7

Though there appears to be some response to potash applied; this response is not as strong as that shown to increase phosphate levels. Below are given some examples of response of fresh weight yield to phosphate levels. These treatments are given in groups of the three different levels of phosphate.

N1	60.8	N2	24.1	N3	29.3
N1 P1	42.1	N2 P1	42.9	N3 P1	50.8
N1 P2	45.8	N2 P2	56.1	N3 K1	56.0
N1 K1	29.4	N2 K1	31.6	N3 K1	22.9
N1 P1 K1	54.0	N2 P1 K1	58.1	N3 P1 K1	63.3
N1 P2 K1	60.8	N2 P2 K1	76.3	N3 P2 K1	76.6

This trial will be continued until the end of this year, 1972.

Arable/Ley Rotation Trial

Introduction

This project which considers the subjects of farm management and utilization of resources commenced in October, 1966 and is being conducted on a section of land measuring 14.49 acres. Reports on the economic feasibility of a farm unit of this size have been made as follows:-

1967 Annual Report, Agronomy Section
1968 Annual Report, Agronomy Section
1970 Annual Report, Pasture Section

This is the fourth progress report on the trial.

Crops

The bean crop that was planted in 1970 for inclusion in this report showed very poor germination and was ploughed in; because of late planting it was not possible to plant another crop. The corn planted in 1971 was undersown with seeds of Nunbank Buffet. This grass grows very fast, however, and since no control could be practiced, it smothered the corn (Refer growth rate of this grass in the report on the Grass Species Trial, Central Farm).

Cattle Rotation

The operation of the project in 1971 was the same as that in 1970. Seven steers were placed on seven (7) acres of pasture which was divided into three (3) blocks - Block 3, Pangola Grass, 2.14 acres; Block 6, Jaragua Grass, 2.48 acres; and Block 2, Pangola Grass, 2.22 acres. The steers were rotated from one paddock to another every two weeks.

The trial began on 3rd March, 1971 and terminated on 24th January, 1972. The steers gained 1.3 lb. per day while on the experiment. Total weight-gain for these steers for approximately eleven (11) months was 2955 pounds. This represents about 422 pounds of beef produced per acre per year; shrinkage en route to market caused a loss in weight which reduced marketable beef from 422 pounds to 401 pounds per acre per year. At the price received - i.e., thirty-two dollars (32.00) per 100 lb. liveweight, the gross revenue received from an acre of pasture in this year's experiment was approximately one hundred and twenty-eight dollars (\$128.00)

Observations showed that there was a significant loss in weight when steers were placed in Block 6 (Jaragua) while this grass was forming stalks. This occurred from August/September until the end of the experiment; the low leaf: stem ratio, deficient nutritive value and low palatability of Jaragua Grass during this period may have caused this poor performance. It is certain that if Block 6 had been planted to Pangola grass, a heavier stocking rate and better profit margin could have been realized.

Table 1 shows the initial and final weights of the steers on Central Farm along with average daily gains.

TABLE 1

Average Daily Gains (pounds/day)

BRAND	WEIGHT MARCH	WEIGHT JANUARY	AVERAGE DAILY GAIN.
0/03	475	788	0.96
9/204	480	981	1.53
9/193	496	863	1.12
0/14	515	900	1.18
0/15	523	993	1.44
9/43	541	980	1.34
9/192	590	1,070	1.50
AVERAGE	517	939	1.29

TABLE 11 CARCASS DATA

BRAND	(Pounds) Farm Weight	(Pounds) Packer Weight	Hot Carcass Weight	Dressing % Age	Confor. Score	Matu- rity	Kidney Knob %	Rib eye Area	Fat Thick- ness	Marbl- ing.	Quality Grade.
0/03	738	782	488	57.5	5	C	Moderate	12.5	.5	Small	Commercial
9/204	981	962	555	56.2	6	B	F/Mod.	12.5	.5	Slight	Standard
9/193	863	850	488	56.0	6	B	Moderate	14.5	.4	Modest	Good
0/14	900	885	492	54.2	5	D	Fair	16.3	.3	Slight	Utility
0/15	993	955	527	53.8	7	B	F/Mod.	15.5	.5	Trace	Standard
9/43	980	945	538	55.5	8	C	Fair/ Moderate	11.4	.3	Trace	Utility
9/192	1070	1050	591	54.8	8	C	Fair Moderate	13.5	.5	Slight	Utility.

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1. Conformation - refers to build, degree of muscling, secured from 1 -10 points.
2. Maturity - refers to age of carcass - 24 months.
3. Rib-eye - calculated in square inches - obtained at 10th rib.
4. Fat thickness - inches.
5. Marbling Score - ranges from very abundant to practically devoid.
6. Grades are Prime, Choice, Good, Standard, Commercial, Utility, Cutter and Canner - from most desirable to least.

All values obtained for Rib Eye Area appear to be too high.

The steers continued to gain satisfactorily until a couple weeks before the date of marketing. It is possible that satisfactory weight gains may have been received from further pasturing. It has been suggested that a period on supplementary feeding might have lifted the quality and value of the carcasses considerably. Efforts will be made during 1972 to put this suggestion to the test.

The data from the carcasses of these steers appear in Table 11. It should be stated that this data is subjective in that it was obtained by personnel relatively inexperienced in this type of work - i.e., carcass evaluation. As a result, it would not be advisable to compare these results with those obtained for a different set of animals; they can be compared, however, among themselves.

During the course of the year it was decided that animals would be yarded before weighing and weight-gains taken only from yarded weights. This method of weighing was adopted so that variation in calculated daily weight gain should be as small as possible. The information collected from six (6) such weighings showed average percentage weight loss to be as follows:-

6.2%, 4.7%, 5.1%, 5.6%, and 4.1%, the average being 5.1% weight loss.

A total profit of eight hundred dollars and twenty-eight cents (828.28) was made in 1971 from the pastures; no returns were obtained from Crops.

Conclusion

For 1972, it has been decided to use four blocks (namely Block 1, 111, 1V, and V) for pasture rotation and the other two blocks for arable cropping. The arable cropping will be done so as to allow a crop each of corn, vegetables and beans per year and will be under the supervision of the Research Division as in former years. Efforts are presently being made to introduce a new set of steers to this trial.

	CREDIT	DEBIT
Sale of Cattle	\$2057.28	
Cost of Cattle (\$.25 per pound)		905.00
Cost of Fertilizer		175.00
Cost of applying Fertilizer		40.50
Cost of bushhogging		37.50
Cost of drenching		4.00
Cost of Spraying		3.50
Cost of Minerals		22.00
Cost of Transportation		70.00
Profit for the year		800.28
Balance	\$2057.28	\$2057.28

With much information already gained from the introduction of blocks and from regional species trials, two particular aspects of pasture research and development now require increased attention. These are the place of legumes, either native or introduced, in pasture associations, and the evaluation of pasture productivity through the grazing animal.

D. AGRICULTURAL EXTENSION

(1) CROPS EXTENSION:-

(a) Extension Activities:-

Extension activities involved the distribution of seeds, demonstration of improved cultural practices, storage demonstrations, processing and supervising of loans, and assisting farmers in obtaining mechanical services.

Farmers were encouraged to mechanize rice production in the Toledo district. In the Cayo District, ten farmers used improved rice seeds for the first time. As a result of demonstrations, many farmers in the Cayo, Orange Walk and Corozal districts adopted the use of fufigation in grain storage.

The following is a summary of extension methods used throughout the year under review:-

<u>Method</u>	<u>Number of Times Used</u>
Extension Visit	2,496
Method Demonstration	37
Results Demonstration	40
Lectures	32
Discussions	43
Field Tours	15

(b) Youth Work:-

A successful school garden competition was sponsored among three schools in the Cayo District. The children in these schools were given lectures and taken on tours with respect to vegetable gardening. Three groups of school children were shown around Central Farm on educational tours. The extension Staff assisted the Social Development Department in organizing 4-H agricultural projects. In the Orange Walk District, high school students were taken on conducted tours of the district agricultural station and were given demonstrations on the art of budding.

(c) Agricultural Shows:-

The 1971 National Agricultural Show consisted of a week of activities throughout the country climaxed by the show itself at the show grounds in Belmopan. Agriculture week was opened on the 7th November by the Minister of Agriculture, who spent the following week touring the various districts and participating in farmers' rallies. The National Agricultural Show took place on the 13th and 14th November. The following is a summary of statistics compiled:-

Livestock.

No. of cattle entered	50 Animals
No. of horses entered	12 Animals
No. of Pigs entered	17 Animals
No. of Sheep entered	9 Animals.

Crops

No. of crop entries	72
No. of entries filled	60
No. of farmers winning prizes	103
No. of industrial and commercial booths	6
No. of miscellaneous display booths	14

Estimated Attendance:-

First day 3,000 persons
Second day 5,000 "

The villages of August Pine Ridge and San Felipe in the Orange Walk Districts each held an agricultural show in April and May respectively.

(d) Farm Planning:-

The Farm Planning Officer attached to the Crops Extension Division was not able to perform his proper functions due to a shortage of personnel. Farmers were selected for farm management studies, but this work could not be followed up. Surveying and levelling was done for a group of farmers from Progreso village in the Orange Walk District, and for one farmer in the Cayo District.

(e) Credit Supervision:-

The processing and supervision of Agricultural loans was the responsibility of extension field staff stationed in the districts.

There was a marked increase in the number of loans processed during the year. As a part of the Belizean Green Revolution drive, two commercial banks gave small loans to farmers. Barclays Bank and the Royal Bank of Canada together issued a total of \$5,603 in loans to 24 farmers. The table below gives comparative data on loans issued from the Agricultural Production Credits Fund and the Small Farmers loan Fund over the period 1969 to 1971:-

<u>Type of Loan</u>	<u>Year</u>	<u>No of Loans</u>	<u>Total Value</u>
Agricultural Credits	1969	6	\$23,597.77
	1970	40	111,453.54
	1971	45	120,855.06
Small Farmers'	1969	1	83.12
	1970	245	52,363.74
	1971	356	93,325.87

(f) Training and Information:-

In-service courses for staff of the Department as well as for farmers were held during the year. Three short courses were held at the Central Farm Agricultural School for a total of 35 Staff members. The subjects covered included : Farm Business Management, Agricultural Credits, and Extension Methods.

A total of seven courses covering a period of nine days were given in Central Farm, Orange Walk and Toledo involving 168 farmers. The subjects dealt with were cooperative Business Management, Care and Maintenance of Farm tractors and Weed Control. Films of agricultural interest were shown throughout the country. A total of 21 showings were made involving an estimated 3,500 farmers.

A supply of extension hooklets or leaflets was maintained during the year and distributed to farmers. The radio programme "Farming for Progress" was continued, 44 broadcasts being made on all aspects of Agriculture.

(g) Crop Production Surveys:-

The crops Extension Division completed the following surveys during 1971:-

- (i) Survey of Corn and Rice Plantings.
- (2) Survey of Red Kidney Beans Plantings
- (3) Sugar Cane Survey
- (4) Survey of Damage due to Tropical Storm 'Laura'.

An attempt was made on a Farm Resource survey, but due to staff shortages, it was not completed.

(2) LIVESTOCK EXTENSION:-

The outstanding features of the year were the completion of the Veterinary Centre in Belize City, the acquisition of nearly 700 head of female cattle imported from Costa Rica under British Aid, and the establishment of two new holding areas to accommodate them.

(a) Laboratory Services:-

With the advent of the new Veterinary Centre in Belize City, considerable expansion of present services will be possible. The need for training of local staff is now more urgent, as they will be needed to man the diagnostic laboratories which it is hoped to establish in the major livestock areas over the next few years.

For some time to come, however, it will be necessary to lean on outside laboratories for assistance, particularly in the more sophisticated fields such as Virology and Toxicology. Continued assistance has been received from the University of Connecticut and, in the case of rabies diagnosis, from Guatemala.

Total laboratory examinations, carried out during 1971 were 1057, a 16% increase over the previous year. There was a shift in emphasis from dogs to cattle, particularly the examination of blood smears for anaplasma and babesia. Details of laboratory examinations may be seen in appendix VI

(b) Clinical Treatments:-

An indication of the range of cases treated is given in Appendix VII. Discounting poultry and V.E.E. vaccinations, the total number of cases recorded shows an increase of approximately 1,000 cases or 25% over the previous year.

Much remains to be done, but there is undoubtedly also a substantial increase in the treatment of animals by farmers themselves, and this is an encouraging indication of growing awareness of the importance of animal health.

(c) Drugs and Equipment:-

The Department still remains the major purveyor of veterinary drugs to the farming community, a role which is likely to continue and increase with a development of livestock extension services, until such time as commercial sources are more extensively organised.

The sale of equipment is also increasing gradually but it will be some time before district centres and extension agents are adequately supplied. The intention is to equip each extension worker with a personal issue of basic requirements, with more sophisticated and expensive items, less frequently used, held at each district centre.

(d) Artificial Insemination:-

Rather slow progress was made on the construction of the A.I. centre at Central Farm. Meanwhile, however, arrangements have been made for a limited A.I. programme to be started in 1972 using imported frozen semen. This will involve a preliminary survey and extensive educational work. The future of artificial insemination will, of course, be largely bound up with the development of the dairy industry which is as yet in its infancy.

(e) Credit Supervision:-

Livestock Extension staff have been closely involved with processing loans, mainly from the Agricultural Credit Fund. Seventeen loans were approved for cattle projects, eleven for pigs, and one loan for other projects totalling \$58,700.

(g) Pig Husbandry in the Toledo District:-

Pig rearing is traditional among farmers of the Toledo district, who supply a considerable proportion of all pigs slaughtered in Belize City. These pigs, however, are raised under minimal standards of husbandry, and take one to two years to reach an average dressed weight of 70lbs. An attempt was made to demonstrate improved husbandry techniques. During the year 35 purebred pigs were obtained from Central Farm and sold to progressive farmers mainly in the San Antonio, Columbia and Crique Jute areas of the district. Prior to distribution, pens were constructed, concrete slab floors were laid, and an adequate supply of feed obtained by the farmers involved. At last report, the pigs were all doing well and it is hoped that in 1972 good quality pigs both for the market and for breeding stock will be forth coming from the Toledo District.

Transport of pigs to and from the Toledo district has always been a problem on account of the long distance and the poor condition of the road during certain periods of the year. It was therefore decided to support the extension work by establishing a piggery at the Toledo Agstat, which was completed at the turn of the year.

(h) Dairy Development:-

It is envisaged that a national dairy industry will probably develop around processing facilities based in the vicinity of Belmopan. With this ultimate end in view, a preliminary survey was made of existing and potential dairy farmers in the Cayo District. The results of the survey have served to demonstrate only too clearly how small is the existing base upon which to build a national industry. It is hoped that the introduction of artificial insemination in 1972 will serve as an important stimulus to this work.

(i) National Agricultural Show:-

A very successful Show was held in November at which the Livestock Division featured a pavilion with livestock, animal health, and pasture exhibits including models, fencing, and gates, and plots of different pasture grasses.

The Division also entered the competitive livestock classes and won the following awards:-

Local Braham heifers	2nd prize
Imported " Bulls	2nd Prize
Imported Indu-Brasil bulls	2nd Prize
Imported Charolais bull	1st Prize
Red Poll Heifers	1st Prize
Red Poll Cows	1st Prize
Red Poll Bulls	2nd Prize
Jamaica Black Cows	1st Prize

Hereford heifer	1st Prize
Dairy Bull	Trophy
Dairy Cows	Trophy, 2nd and 3rd Prizes
Imported Female	Champion
Reserve Imported Female	"
Reserve Imported Bull	"
Senior Boar	"
Junior Boar	"
Boar ...	Grand Champ.
Female sheep	" "

(3) Mechanical Extension Services:-

The Mechanical Division of the Department of Agriculture offered mechanical services to farmers, in addition to performing such services for the schemes being run by the Department itself. Some 1,300 acres of land were cleared and mechanically cultivated for farmers during the year under review. There is a dearth of such services in the private sector, and the Department's machinery was unable to cope with the farmer's demands for services.

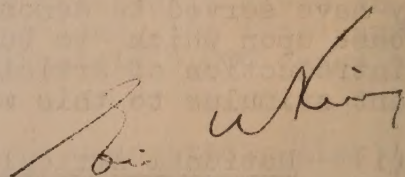
In addition, the well rig run by this division successfully completed thirteen wells, while thirteen others had to be abandoned due to technical difficulties. Fourteen ponds were dug on farms throughout the country.

CONCLUDING REMARKS

The Department of Agriculture is geared towards increasing the productivity of our farmers by educating them in the use of improved production practices. It is generally realised that increased productivity will result **only** if farmers change from the age-old system of shifting cultivation to a more sedentary form of mechanised agriculture, the Department is doing its utmost to accelerate this process.

ACKNOWLEDGEMENTS

Continued help and co-operation has been received from official bodies, other Government Departments and private individuals. help is greatly appreciated.



(E. W. KING)

Chief Agric. Officer,

